REMARKS

The Office Action rejects claims 8-14 under 35 U.S.C § 112, second paragraph. The Office Action also rejects claims 8 and 10 under 35 U.S.C § 102(b) as being anticipated by Garner et al. (Published U.S. Patent Application No. 2004/0017986). Additionally, the Office Action rejects claims 9 and 11 under 35 U.S.C § 103(a) as being unpatentable over Garner in view of Moridaira et al. (Published U.S. Patent Application No. 2003/0086670). The Office Action also rejects claims 12 and 13 under 35 U.S.C § 103(a) as being unpatentable over Garner in view of Evans et al. (U.S. Patent No. 5,822,487). Additionally, the Office Action rejects claim 14 under 35 U.S.C § 103(a) as being unpatentable over Garner in view of Evans and further in view of Cocchini et al. (Published International Patent Application No. WO 01/33184).

By this Reply, Applicants have amended independent claim 8 to recite "b) heating the glass material of an end portion of the optical fiber preform in a furnace; c) drawing the heated glass material at a drawing speed V to form an optical fiber, each portion of the drawn glass material having a viscous zone when passing through the furnace, the viscous zone having a viscous zone length L; and d) applying to the optical fiber a substantially sinusoidal spin, which is transmitted to the viscous zone; characterized in that the spin function frequency *v*, the viscous zone length L and the drawing speed V being such that both a torsion and at least a 50% detorsion are applied to the viscous zone of each portion of the drawn glass material." Applicants have also amended claim 10 to recite "wherein the spin function frequency *v*, the viscous zone length L and the drawing speed V are such that both a torsion and at least

a 60% detorsion are applied to the viscous zone of each portion of the drawn glass material." Additionally, Applicants have amended claim 13 to depend from claim 8, rather than claim 12. Applicants respectfully submit that the originally filed application fully supports these amendments. No new matter has been added. Claims 8-14 are currently pending in the application.

Claim Rejections Under 35 U.S.C. § 112, Second Paragraph

Regarding the rejections of claims 8-14 under 35 U.S.C § 112, second paragraph, Applicants respectfully submit that the claims fully comply with the definiteness requirements under 35 U.S.C § 112. Regarding claims 8 and 10, the Office Action states "[i]t is unclear how the spin frequency, zone length, and drawing speed is related to a torsion or detorsion." Office Action at p. 2. Applicants respectfully submit that a person of ordinary skill in the art, having read the specification of the present application would understand that these variables would determine whether a given portion of the fiber would remain in the viscous zone long enough to first undergo torsion and then detorsion. If the drawing process has a low viscous zone length L, a high draw speed V, and/or a low spin function frequency v, a portion of the fiber may undergo only torsion before leaving the viscous zone. Applicants respectfully submit that a person of ordinary skill in the art would readily understand that different zone lengths L would affect whether detorsion occurs in the viscous zone and, if so, how much detorsion occurs. Similarly, Applicants respectfully submit that a person of ordinary skill in the art would readily understand that different draw speeds and spin function frequencies would also affect whether the fiber undergoes detorsion by

affecting the time a given portion of the fiber remains in the viscous zone and the duration of spin in each direction.

Additionally, the Office Action expresses confusion regarding the meaning of the term spin function amplitude Θ_0 recited in claim 14. The Office Action indicates that the confusion exists because "other prior art refers to amplitude in units of turns/meter." Office Action at p. 2. Applicants respectfully submit that the specification of the application clearly states repeatedly that the term spin function amplitude Θ_0 is measured in turns for the purposes of this application. P. 9, l. 9; p. 13, ll. 4-7; p. 14, ll. 7-9; p. 16, ll. 18-19.

Additionally, the comparison of the term $2V/v\pi$ to Θ_0 in the inequality recited in claim 14 causes confusion for the Examiner regarding the units associated with Θ_0 because the Examiner does not understand how $2V/v\pi$ could have the same units as Θ_0. Office Action at p. 2. Regarding this, Applicants respectfully submit that different sides of an inequality do not need to have the same units. Rather, one may use an inequality to compare the numerical quantity of one type of thing to the numerical quantity of another type of thing.[1] So long as the units associated with each compared term are clearly known, one can compare the numerical value of the compared things without regard to the units. Here, claim 14 itself clearly provides that the end terms of the inequality have the units m/Hz, and the specification clearly conveys that the middle term, spin function amplitude Θ_0, is measured in turns. Thus, to determine whether a

[1] For example, one could use an inequality to express that the number of apples contained in a first basket exceeds the number of oranges contained in a second basket.

given drawing process falls literally within the bounds of claim 14, one would merely have to calculate the values of the end terms in m/Hz, determine the value of the middle term in turns, and compare the numerical value of the middle term to the numerical values of the end terms. Accordingly, Applicants respectfully submit that a person of ordinary skill in the art would readily understand from the specification of the application that the term spin function amplitude Θ_0 is measured in turns for purposes of the present application.

For at least the foregoing reasons, Applicants respectfully submit that claims 8-14 fully comply with the definiteness requirements under 35 U.S.C § 112. Accordingly, Applicants respectfully request withdrawal of the rejection of claims 8-14 under 35 U.S.C § 112, second paragraph.

Claim Rejection Under 35 U.S.C. § 102(b)

Regarding the rejections of claims 8 and 10 under 35 U.S.C. § 102(b), Applicants respectfully submit that Garner cannot anticipate these claims. In order to anticipate a claim, a reference must teach every limitation of the claim. M.P.E.P. § 2131.

The present invention relates to spinning optical fibers during drawing, with the benefit of reduced PMD. Garner recognizes that spin frozen into a fiber in the final product can reduce PMD. ¶¶ 7-14, 22-23, 38, 46, and 52. Toward this end, Garner discloses a method of spinning a fiber to give it frozen-in spin. ¶¶ 38-57. Garner discloses that the quantity of spin frozen into the final product may vary from the quantity of spin applied during drawing because of various factors affecting rotational transfer, indicating undesirability of any difference between the spin applied to the fiber

in the viscous zone and the frozen-in spin. ¶¶ 10, 13-20, 39, and 42. Thus, Garner suggests the desirability of producing frozen-in spin as close as possible to the applied spin. *Id.* And Garner indicates that the correspondence between the applied spin and the frozen-in spin lies within accepted tolerances to achieve the benefits of the invention it discloses. ¶¶ 20 and 42.

By contrast, Applicants' invention relates to the realization of favorable results with a method that produces significantly less frozen-in spin than the maximum applied spin. Specifically, the inventors have found that (1) by properly selecting the spin function frequency v, the viscous zone length L, and the drawing speed V such that both a torsion (or spin) and at least a 50% detorsion (or spin) are applied to the viscous zone of each portion of the drawn glass material, a substantial difference is obtained between the applied spin and the frozen-in spin, even in the absence of said various factors affecting the rotational transfer, and that (2) notwithstanding said difference a significant PMD reduction is achieved. This approach produces a substantial difference between the frozen-in spin and the maximum applied spin because, when <u>each</u> portion of drawn glass material experiences along the viscous zone first a torsion <u>and</u> then at least a 50% detorsion, the applied torsion is partially removed by the detorsion. Moreover, a significant PMD reduction is achieved - notwithstanding said difference between the maximum applied spin and the frozen-in spin - due (Applicants believe) to the fact that the viscous torsion, undergone in the furnace by each portion of drawn glass material, significantly affects the geometrical asymmetries of the optical fiber and, thus, the local birefringence intensity (i.e., the local beat length) thereof, irrespective of the direction of

the applied spin.[2] Thus, in contrast to the teachings of Garner, Applicants have found that a significant PMD reduction can result even with a substantial difference between the maximum applied spin and the frozen-in spin.

Applicants have amended claim 8 to more clearly convey this feature of the invention, reciting that "the spin function frequency v, the viscous zone length L and the drawing speed V are such that both a torsion and at least a 50% detorsion are applied to the viscous zone of each portion of the drawn glass material" (emphasis added). Applicants respectfully submit that Garner does not teach or suggest these features of the claimed invention. The spin functions employed in Garner's methods include periods of spinning in one direction and periods of spinning in the opposite direction, such that some portions of the fiber would experience torsion in one direction and other portions of the fiber would experience torsion in the other direction (detorsion). *See* ¶¶ 40 and 49-53; Figs. 5A, 5B, and 6. However, Garner includes no disclosure that each portion undergoes detorsion while in the viscous zone, or that any given portion undergoes both a torsion and a detorsion while in the viscous zone.

For at least the foregoing reasons, Applicants respectfully submit that Garner cannot anticipate claims 8 and 10. Accordingly, Applicants respectfully request withdrawal of the rejection of claims 8 and 10 under 35 U.S.C. § 102(b).

[2] However, Applicants do not intend to be bound by this theory, but only by the structure and limitations set forth in the claims.

Claim Rejections Under 35 U.S.C. § 103(a)

Regarding the rejections of claims 9 and 11-14 under 35 U.S.C. § 103(a), Applicants respectfully submit that the Office Action does not establish a *prima facie* case of obviousness. A proper obviousness rejection must address every claim feature. See M.P.E.P. § 2143.03. In a method according to any of claims 9 and 11-14, "the spin function frequency v, the viscous zone length L and the drawing speed V are such that both a torsion and at least a 50% detorsion are applied to the viscous zone of each portion of the drawn glass material" (emphasis added). As discussed above, Garner does not teach or suggest these claimed features. Additionally, Applicants respectfully submit that Moridaira, Evans, and Cocchini fail to cure this deficiency.

Additionally, Applicants respectfully submit that Garner teaches away from the claimed invention. A reference that teaches away from a claimed combination generally cannot support a *prima facie* case of obviousness of that claimed combination. McGinley v. Franklin Sports, Inc., 262 F.3d 1339, 1354 (Fed. Cir. 2001), citing In re Gurley, 27 F.3d 551, 553 (Fed. Cir. 1994). A reference teaches away from a claimed invention if reading the reference would discourage a person of ordinary skill in the art from implementing the claimed invention. Tec Air, Inc. v. Denso Mfg. Michigan Inc., 192 F.3d 1353, 1360 (Fed. Cir. 1999), citing In re Gurley, 27 F.3d 551, 553 (Fed. Cir. 1994).

A method according to each of claims 9 and 11-14 includes, *inter alia*, "applying to the optical fiber a substantially sinusoidal spin." Garner indicates that such an approach provides an unsuitable fiber, stating that "a substantially sinusoidal spin function does not optimize the reduction of PMD." To address these concerns about a

"substantially sinusoidal spin function," Garner discloses only modulated sinusoidal functions as part of the invention disclosed therein. See ¶¶ 33-35 and 49-57; Figs. 5A, 5B, and 6. Consistent with this, Garner distinguishes between substantially sinusoidal and modulated sinusoidal spin functions by using the term "prior art" in connection with substantially sinusoidal spin functions and referring to modulated spin functions as belonging to "the present invention." See ¶¶ 30, 31, 33-35; and Figs. 3B, 3C, 5A, 5B, and 6. Thus, Applicants respectfully submit that Garner would discourage a person of ordinary skill in the art from using a substantially sinusoidal spin function.

For at least the foregoing reasons, Applicants respectfully submit that the Office Action does not establish a *prima facie* case of obviousness of claims 9 and 11-14. Accordingly, Applicants respectfully request withdrawal of the rejections of claims 9 and 11-14 under 35 U.S.C. § 103(a).

Conclusion

In view of the foregoing, Applicants respectfully request reconsideration and reexamination of this application and the timely allowance of the pending claims.

The Office Action contains characterizations of the claims and the related art with which Applicants do not necessarily agree. Unless expressly noted otherwise, Applicants decline to subscribe to any statement or characterization in the Office Action.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

If the Examiner believes a telephone conversation might advance prosecution, the Examiner is invited to call Applicants' undersigned agent at 202-408-4492.

Respectfully submitted,

FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER, L.L.P.

Dated: September 21, 2009

By: 

Neil T. Powell
Reg. No. 45,020